

few will object; but the possibility of applying them in the present state of science is, and probably will be, fiercely contested; and it may be justly urged that the descriptions in the works of the masters he alludes to, would not, in many cases, have been recognisable had the types not been in existence, or had it not been for the beautiful iconographic works of those authors whom he somewhat derogatively terms "simply collectors."

Turning to the purely systematic arrangement of the author, we find the *Lepidoptera* divided into *Rhopalocera* and *Heterocera*, or into *Diurna*, *Crepuscularia*, *Nocturna*, and *Microlepidoptera*. This is broad grouping, and we shall be curious to see, in a future volume, how it is proposed to get over the difficulties of the last-named. On some points of minor arrangement the author's views will be regarded as rank heresy by most entomologists of the present day; and the most notable of these are the positions assigned to those anomalous groups known as the *Castniadae* and *Uraniadae*, which are boldly united with the *Rhopalocera*, as groups 10 and 11 of that division, in opposition to the ideas of almost every one, and notably to those of Boisduval and Westwood (the latter author's recent memoir on the genus *Castnia*, and others, in the *Trans. Linn. Soc.*, ser. 2, Zoology, vol. i., 1877, is alluded to in the text attached to the plates). It is scarcely to be expected that the reasons given for this course will be found convincing to the majority; could it be so, the arrangement would be hailed with satisfaction by those numerous collectors who, confining themselves to "butterflies" only, are now debarred from adding to their stores some of the most beautiful insects that exist. The *Crepuscularia* are divided into *Sphingidae* and *Sesiidae*; the *Zygenidae* are not represented in the author's faunistic region, but the *Glaucoptidae*, often associated with them, are transferred to the *Bombycoidea*, and head that section. Many other points might be alluded to in which the author departs from common practice in systematic views, but it is only fair to him to state that, in all cases, he gives the fullest reasons for adopting the course, however insufficient they may appear to others; but this notice has already become too lengthy, and they must be left to the discretion of specialists, all of whom must of necessity possess the work. An inconsiderable number of new species are described.

The plates (only an uncoloured copy of the atlas is before us) are admirably executed, the drawings having been made by the author himself, and lithographed at Berlin, a course which has added greatly to their value, owing to the present impossibility of finding sufficiently skilled engravers in Buenos Ayres; at the same time it has naturally caused delay. The value attached to the beautiful representations of the transformations of many species, cannot be too highly estimated, and the explanatory text is very ample, containing also new matter, not appearing in the body of the work. R. McLACHLAN

MODERN METEOROLOGY

Modern Meteorology. A Series of Six Lectures Delivered under the Auspices of the Meteorological Society in 1878. (London: Edward Stanford, 1879.)

THE publication of "The Origin of Species" and the introduction of the spectroscope as an implement of research, have not wrought perhaps a greater revolu-

tion in the biological and physical sciences than has the invention of weather charts in the younger science of meteorology. One has only to look back a quarter of a century at the writings of meteorologists to see the radical change which has been brought about, not merely as regards the nomenclature of the science but even as regards the standpoint from which the whole phenomena of atmospheric movements are looked at. It was to diffuse more generally a knowledge of this change that the Council of the Meteorological Society arranged the delivery of these six lectures, which on the whole faithfully portray to the reader the present state of meteorology in its outstanding features.

From its important bearing on the future of meteorology in the British Islands, we note with great satisfaction the remark in the lecture on "Air Temperature" that the same pattern of thermometer box, viz., that known as the Stevenson, has been adopted at the stations of both the English and Scottish Meteorological Societies, to which may be added the stations of the Meteorological Office; and we heartily endorse the opinion expressed by the lecturer, Mr. J. Knox Laughton, that on such a vital subject as the observation of the temperature, absolute uniformity of pattern which is secured by the adoption of Stevenson's box, is better even than Utopian excellence.

The lecture by Mr. Strachan on the "Barometer and its Uses" is characterised by a full and exact knowledge of the instrument and its history, and a correct estimation of the present state of the problems relating to atmospheric pressure with which he has occasion to deal. His examination, for instance, of various theories which have been broached in explanation of the diurnal range of the barometer is acute and satisfactory, and from that examination he shows that a hypothesis yet remains to be framed which shall account for the diurnal oscillations of the barometer. The truth is, none who have yet attempted to account for the diurnal barometric oscillations—one of the widest spread and constant of terrestrial phenomena—have had before them sufficiently the facts of observation such as might indicate, with the requisite fulness of detail, the influence of geographical position on the problem which it is sought to solve.

Mr. Strachan throws out incidentally a valuable hint regarding the forecasts of our European weather which are wired from America. He says (p. 95):—

"It is worth while inquiring how our American friends manage this business. They are not very willing to show their hands, as the saying is. However, we may surmise how it is done. They have active agents who make extracts of the logs of all the steamers directly they arrive in New York, and by means of these extracts they can follow up all the storms which occur in our parallels. Thus it may often happen that information of storms is obtained by the *Herald* before they have had time to reach western Europe. The *Herald* at once flashes the news by telegraph. We get the telegram surely and speedily and the storm, if it does not vanish in the meantime, shortly afterward."

Whether this be the practice of the expert of the *New York Herald* or not, there cannot be a doubt that we have here an indication of the way in which substantial advance may be made in our system of weather forecasting, viz., by some central authority in America at once receiving by telegraph extracts from the logs of all vessels

directly they arrive at Atlantic ports; by the aid of which, warnings may be framed, and wired to Europe, of such storms as may appear to threaten its coasts. In this connection it is not possible to overestimate the importance of a telegraph wire to Farö and Iceland, by which warnings of many storms thus seen approaching our coasts, could be issued one or two days earlier at least than at present.

Mr. Clement Ley contributes an extremely interesting, and in some respects a very valuable lecture, on clouds considered as weather-signs, accompanied with nine well-executed illustrations in colours. Mr. Ley has been a close observer of the forms and movements of clouds almost from infancy, being even then strongly under the fascinating spell of their mystery and beauty. Habits of close and accurate observation were thus formed and the tendency has become so inveterate that to this day a twelfth part of his waking existence is spent in observing the clouds. For several years he has given the closest observation and study to a strict examination of the relations of different clouds to cyclones, anticyclones, and to thunderstorms, in other words, to changes of weather. It is the results of this examination which form the most valuable part of the lecture, these results being of the utmost importance to the isolated observer, who may take the trouble to follow up the subject, in enabling him with better success to forecast the weather though aided only by his own observations. A treatment of the subject with greater fulness than is possible in a single lecture would be warmly welcomed by meteorologists and all others interested in weather.

In one of the lectures it is stated with much emphasis that "the great need of every branch of meteorology is neither more observations nor more money (though, neither of these is to be despised), but more brains, more hard workers, more deep thinkers." In a certain sense this is true, but in a wider sense it does not represent the most pressing needs of meteorology. In the last lecture of the series, Mr. Scott justly remarks that as regards synoptic work on a large scale, we may look our critics in the face and boldly ask for more observations, no matter how our shelves may be bending beneath the weight of undiscussed records. The truth is, those who are engaged with original researches in meteorology find themselves ever and anon seriously hampered, if not completely arrested in their work for want of the data of observation. We are unaware that any systems of observation at present exist which could furnish, for example, the data for the determination of the horizontal or vertical meteorological gradients, or for ascertaining how far and with what modifications the influence of the sea extends inland. Nay even, though thanks mainly to the indomitable energy of Mr. Symons, there are upwards of 2,000 gauges recording the rainfall of the British Isles, the number, not to mention positions, of these gauges, are too inadequate to admit of even a rude guess being formed as to the quantity of vapour abstracted from the air in the form of rain or snow during any of the storms that sweep across the country. Much less can we, without largely increased observation, give an indication of the varying hygrometric and thermometric states of the atmospheric currents to windward and leeward of the regions of large rainfall in Great Britain. Meteorologists, no less

than astronomers, had cause to deplore a great loss in the death of Leverrier, the keenest sighted of physicists and prince of organisers of systems of observation, one of his last works being the establishment of a system of observation, by which the propagation of rain, hail, and other weather phenomena, could be followed from commune to commune over France. With such results as may be expected from this system, and from General Myer's magnificent scheme of monthly meteorological charts for the whole of the northern hemisphere, which will also bring into the field thousands of fresh observers, physical data leading towards the solution of some of the great meteorological problems will be supplied, without which observational data, mere brain-work—such is the complexity of the problems to be dealt with—would prove either useless or positively mischievous.

OUR BOOK SHELF

Farming for Pleasure and Profit. By Arthur Roland. Edited by W. H. Ablett. (London: Chapman and Hall, 1879.)

THIS small book has the defects as well as the merits which might have been expected in the work of an amateur farmer. His own practice seems usually sound and sometimes ingenious, but his explanations and advice cannot always be safely trusted. When he tells us what he has himself done, we listen with attention; when he offers us page after page full of antiquated veterinary nostrums, we cannot feel edified. We did not know till now that foot-and-mouth disease was *epidemic*; the cause and cure of apthæ (*sic*) is not quite adequately given on p. 205; and we should certainly hesitate before adopting the following treatment (p. 191) for a cow suffering from moor-ill:—"Some insert a seton in the dewlap and take away ten pounds of blood in very severe cases. A recipe has been given to administer, in very obstinate ones, six drachms of aloes, twelve ounces of sulphur, and sixteen drops of croton oil, the first day, in addition to a blood-letting of ten ounces," and so on with further directions of the heroic order. When Mr. Roland tells us of all the breeds of cows, of the cheese-factory system, and of a dozen other matters, of which, so far as we can learn, he has had no actual experience, we feel that his space and our time might have been more profitably occupied. That a good deal of information, and not a little amusement into the bargain, may be got out of Mr. Roland's book, is not to be denied, however. Whether "a great number of persons who would gladly supplement their incomes, if they could see their way clear to do it, by entering into rural occupations which are congenial to their tastes," would be able to follow the lead of Mr. Roland in his farming practice may be gravely doubted. It is not every amateur pig-feeder who will be so lucky as to find "a good pork-butcher, doing a superior trade, and ready to give nearly thirty per cent. more than could be obtained by selling young porkers haphazard." Nor will the amateur pea-grower always be able to adopt the following excellent and economical plan of disposing of his produce. Mr. Roland stows his green peas ready shelled in two flat wicker baskets under the first-class railway carriage in which he daily travels to town. He finds that the landlord of the hotel where he dines in the city will give him one shilling a quart for these peas, fetching them from the cloak-room of the station where they have been deposited. This ingenious method of marketing hardly admits, however, of general adoption; and, moreover, the railway authorities might have something to say about this plan of evading payment of carriage. Mr. Roland's previous attempts to dispose of cabbages and turnips (pp. 16 and 17) were less satisfactory in their